Application No.: 09/682,443
Amendment in response to office action mailed May 17, 2004

**Amendments to the Claims**

This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of Claims:**

1. (previously presented) A method for controlling hydrocarbon injection into an engine exhaust to reduce NOx, comprising:

injecting the hydrocarbon into the engine exhaust in accordance with detection of a light-off event, such light-off event being detected when there is a hydrocarbon-oxygen reaction wherein an exothermic reaction is produced and detected.

2. (cancelled)

3. (cancelled)

4. (previously presented) A method for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx and the injected hydrocarbon being directed to a catalyst for reaction therein, comprising:

(a) detecting an exothermic reaction across the catalyst;

(b) detecting a temperature of the catalyst in response to the detected exothermic reaction; and

(c) injecting the hydrocarbon into the reaction in accordance with the detected temperature.

5. (previously presented) A method for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx and the injected hydrocarbon being directed to a catalyst for reaction therein, comprising:

(a) detecting a pair of temperatures across the catalyst to provide a temperature difference across such catalyst;

(b) comparing the temperature difference with a predetermined temperature threshold;

(c) determining an exothermic condition temperature when the temperature difference is determined to exceed the threshold, such exothermic condition temperature being determined from one of the pair of detected temperatures;

(d) comparing the determined exothermic condition temperature with an exothermic condition temperature expected from the catalyst at a time prior to the determined exothermic condition temperature; and

(e) modifying the injected hydrocarbon in accordance with said last-mentioned comparison.

6. (previously presented) A method for determining peak efficiency temperature of a catalyst in reducing NOx wherein such NOx is reduced by reacting such NOx in the catalyst with a hydrocarbon, comprising:

(a) detecting a pair of temperatures across the catalyst, such pair of temperatures providing a temperature difference across the catalyst;

(b) comparing the temperature difference with a predetermined temperature threshold; and

(c) determining an exothermic condition temperature when the temperature difference is determined to exceed the threshold, such exothermic condition temperature being determined from one of the pair of detected temperatures.

7. (previously presented) A system for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx and the injected hydrocarbon being directed to a catalyst for reaction therein, comprising:

(a) a catalyst for facilitating a reaction between the injected hydrocarbon and $NO_x$ in the exhaust;

(b) a hydrocarbon injector for injecting the hydrocarbon into the exhaust upstream of the catalyst;

(c) a detecting system comprising:

a pair of sensors each detecting a common parameter in the exhaust, one of such sensors being upstream of the catalyst and the other one of the sensors being downstream of the first sensor; and

a processor for controlling the hydrocarbon injector in response to the pair of sensors, such processor being programmed to:

compare a difference in the common parameter detected by the pair of sensors with a predetermined threshold;

determine an exothermic condition temperature from one of the pair of sensors when the difference in the common parameter is determined to exceed the threshold;

compare the determined exothermic condition temperature with an exothermic condition expected from the catalyst at a time prior to the determined exothermic condition temperature; and

modify the injected hydrocarbon in accordance with said last-mentioned comparison.

8. (previously presented) The system recited in claim 7 wherein the common parameter is temperature and wherein the sensors are temperature sensors.

9. (previously presented) A processor for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx

and the injected hydrocarbon being directed to a catalyst to facilitate reaction between the injected hydrocarbon and the exhaust NOx, such processor being programmed to:

provide a control signal to a hydrocarbon injector to inject the hydrocarbon into the exhaust upstream in response to output signal from a pair of sensors, each of the pair of sensors being adapted detecting a common parameter in the exhaust, one of such sensors being upstream of the catalyst and the other one of the sensors being downstream of the first sensor, such control signal being provided by steps comprising:

comparing a difference in the common parameter detected by the pair of sensors with a predetermined threshold;

determining an exothermic condition temperature from one of the pair of sensors when the difference in the common parameter is determined to exceed the threshold;

comparing the determined exothermic condition temperature with an exothermic condition expected from the catalyst at a time prior to the determined exothermic condition temperature; and

modifying the injected hydrocarbon in accordance with said last-mentioned comparing.

10. (previously presented) A method for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx and the injected hydrocarbon being directed to a catalyst for reaction therein, comprising:

comparing a difference in a common parameter detected by a pair of sensors with a predetermined threshold, one of such sensors being upstream of the catalyst and the other one of the sensors being downstream of the first sensor;

determining an exothermic condition temperature from at least one of the pair of sensors when the difference in the common parameter is determined to exceed the threshold;

comparing the determined exothermic condition temperature with an

exothermic condition expected from the catalyst at a time prior to the determined exothermic condition temperature; and

modifying the injected hydrocarbon in accordance with said last-mentioned comparison.

11. (previously presented) The method recited in claim 10 wherein the common parameter is temperature and wherein the sensors are temperature sensors.

12. (previously presented) A method for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx and the injected hydrocarbon being directed to a catalyst for reaction therein, comprising:

(a) detecting an exothermic reaction across the catalyst;

(b) measuring a temperature of the catalyst in response to the detected exothermic reaction; and

(c) injecting the hydrocarbon into the reaction in accordance with the measured temperature.

13 (previously presented) A method for determining peak efficiency temperature of a catalyst in reducing NOx wherein such NOx is reduced by reacting such NOx in the catalyst with a hydrocarbon, comprising:

(a) detecting a pair of temperatures across the catalyst, such pair of temperatures providing a temperature difference across the catalyst;

(b) comparing the temperature difference with a predetermined temperature threshold; and

(c) determining a temperature of the catalyst when the temperature difference is determined to exceed the threshold, such determined temperature being obtained from at least one of the detected temperatures.

14. (previously presented) The method recited in claim 4 wherein the detected temperature is an upstream temperature.

15. (previously presented) The method recited in claim 5 wherein the exothermic condition temperature is determined from an upstream one of the pair of detected temperatures.

16. (previously presented) The method recited in claim 6 wherein the exothermic condition temperature is determined from an upstream one of the pair of detected temperatures.

17. (previously presented) The system recited in claim 7 wherein the exothermic condition temperature is determined from an upstream one of the pair of sensors.

18. (previously presented) The system recited in claim 9 wherein the exothermic condition temperature is determined from an upstream one of the pair of sensors.

19. (previously presented) The method recited in claim 10 wherein the exothermic condition temperature is determined from an upstream one of the pair of sensors.

20. (new) A method for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx and the injected hydrocarbon being directed to a catalyst for reaction therein, comprising:

(a) detecting an exothermic reaction across the catalyst;

(b) obtaining a temperature of the catalyst at which the exothermic reaction is detected; and

(c) injecting the hydrocarbon into the reaction in accordance with the obtained temperature.

21. (new) A method for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx and the injected hydrocarbon being directed to a catalyst for reaction therein, comprising:

(a) identifying catalyst light-off by detecting production of an exothermic reaction across the catalyst when a temperature difference across the catalyst exceeds a threshold value;

(b) determining a light-off temperature of the catalyst by measuring thetemperature at which the exothermic reaction is detected;

(c) obtaining a measure of catalyst aging based on said detected temperature; and

(d) adjusting injection of the hydrocarbon into the reaction in accordance with the measure of catalyst again.